SALT SUBSTITUTE COMPRISING BIOCOMPATIBLE POLYMER

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to the fields of nutrition, diet, flavoring compositions and food products. In that respect, the present invention relates to seasoning compositions, foods which contain such seasoning compositions, and methods for their respective formulations.

2. Description of the Related Art

The use of salt as a taste and flavor enhancing agent is well known. In food processing, the preservative and organoleptic qualities of salt are well established and it is fully recognized that salt is attractive to the consumer (even when used in quantities deemed unhealthy). The total daily intake of salt in North America is estimated to be in the range of 10 to 12 grams. Salted snack foods account for a significant consumption of salt.

While table salt (which contains sodium and chloride ions) is normally not retained in the body even when consumed in excess, table salt use has been attributed to hypertension and other maladies. Even though a definitive correlation between salt intake and hypertension has not been fully determined, the medical community remains concerned over the extent of salt intake abuse and, accordingly, they advocate reducing salt intake. Doctors recommend reduction of dietary salt for those with many cardiac and renal conditions, particularly those associated with edema, hypertension, arteriosclerosis, pregnancy complications or epilepsy. Further, dietary salt can cause the accumulation of fluids and a corresponding increase in the weight of the body tissues. It is known that it is the sodium in table salt that causes these deleterious effects. As a result, many individuals wish to limit their intake of sodium.

Salt is, however, an important part of the taste sense or taste pattern of most people. Food without salt is often substantially tasteless, flat, and unpalatable. Thus, adhering to a low salt (or salt less) diet can negatively impact the pleasure of eating. Further, unpalatable food is not as easily ingested as that which is enjoyed.

Many attempts have been made to provide substitutes for table salt. In this respect, potassium chloride, ammonium chloride and similar compounds have been suggested. For many, however, the use of these chlorides, and combinations of them, does not provide as desirable an effect as that produced by table salt. Potassium chloride can have a strong "after-taste" which is often characterized as "bitter". This is unfortunate because many diets are lacking in potassium. Accordingly, a palatable formulation of potassium, particularly one which may substitute for sodium intake, is very desirable. At present Americans are consuming less than 50% of the recommended dose of potassium. Ammonium chloride can also have a bitter after-taste, can disturb the acid-base balance in the blood, can produce acidosis, and can stimulate bronchial mucosa causing excess mucous secretion and coughing. Ammonium chloride must be eliminated by the body as urea, thus taxing the functions of the liver and the kidneys. Further, at cooking and baking temperatures, ammonium chloride can decompose thereby changing the pH value, taste and other properties of the food containing in which it is comprised.

A number of U.S. patents disclose and claim inventions relating to sodium-free substitutes. U.S. Pat. No. 2,471,144, issued to E. D. Davy and entitled "Salt Substitute," describes a sodium-free preparation containing chlorides of potassium and ammonium as the primary saline constituents (70-95% of the total ingredients), small amounts of calcium and magnesium cations, and citrate and formate anions. The small amounts of magnesium,

calcium, formate and citrate ions are included in the preparation to "smooth out" the taste. U.S. Pat. No. 2,596,333, issued to A. Halpern et al and entitled "Dietary Salt Substitute," describes potassium chloride particles (70-85% by weight) with a coating comprising an inert binder (gum or starch) and a glutamic acid compound (glutamic acid, potassium glutamate and calcium glutamate). The glutamic acid compound is used to mask the bitter taste of the potassium chloride particles.

U.S. Pat. No. 2,601,122, issued to L. Freedman and entitled "Saline Composition," acknowledges that the sodium-free salts proposed to replace common table salt (including principally potassium chloride and ammonium chloride components), while having a saline taste, have a "metallic" or "bitter" after-taste. Freedman proposes to add a salt of choline to overcome the bitterness normally associated with such chlorides and a caking retardant (a stearate, a starch or a tricalcium phosphate). G. C. Perri and K. Ladenberg in their U.S. Pat. No. 2,824,008, entitled "Salt Substitute," disclose a sodium-free composition comprising, by weight, 45-55 parts of potassium chloride, 30-40 parts of dipotassium succinate, and about 10-20 parts of dipotassium fumarate. The fumarate and succinate act to mask the bitter after-taste usually accompanying the use of potassium chloride.

A further sodium-free "Salt Substitute Composition" has been disclosed and claimed in U.S. Pat. No. 3,505,083 by H. C. Miller. The composition is comprised of about 80-99% by weight of potassium chloride and from about 1-20% by weight of fumaric acid. The bitter after-taste of potassium chloride is allegedly overcome by the fumaric acid component of the composition. A commercial version of this sodium-free composition is marketed by Morton Salt Company as "Morton Salt Substitute." U.S. Pat. No. 4,216,244, entitled "Low Sodium Salt Substitute," issued to A. E. Allen, Jr. and proposes a salt seasoning product having

potassium chloride as its major ingredient (92%) with buffers, flavor enhancers and a suitable anti-caking agent. U.S. Pat. No. 4,243,691 entitled "Sodium-free Salt Substitute" has issued to M. J. Mohlenkamp, Jr. and G. D. Hiler and discloses a sodium-free salt substitute containing nucleotides, an amino acid mixture, a sugar, a potassium phosphate and about 15% to about 50% by weight of potassium chloride. United States Patents 4,473,595 and 5,094,862 also describe salt substitutes, the former using magnesium salts (in addition to sodium chloride and potassium chloride), while the latter utilizes a nonsweet carbohydrate with a sodium chloride coating. United States Patent Application No. 2002/0187243A1 describes seasoning compositions comprising potassium chloride, sugar alchohol, monosodium glutamate, sucrose and sodium inosinate and/or sodium guanylate as table salt substitutes.

Past commercial efforts to provide a low-sodium salt have involved various combinations of flavoring, flavor enhancers and buffers with the potassium chloride together with suitable free-flow agents. In U.S. Pat. No. 2,742,366, issued to R. M. Power and entitled "Salt Substitute and Method of Preparing Same," it is proposed that a low-sodium salt substitute contain between 50% and 70% by weight of potassium chloride, between 15% and 35% by weight of sugar, between 1% and 10% by weight of monocalcium glutimate, and up to 5% (based upon total weight of the salt substitute) of sodium chloride.

R. L. Frank et al in their U.S. Pat. No. 3,514,296 (Reissue No. 27,981), entitled "Salt Substitute," have disclosed a low-sodium salt substitute comprised of 20 to 80% by eight of potassium and 80 to 20% by weight of sodium chloride. The inventors state that such salt composition provides for 80% of the population a saltiness taste greater than an equal quantity of sodium chloride component (alone) of the composition. The commercial version

of the patented product is sold under the name "Lite-Salt" by the Morton Salt Company and contains 50% potassium chloride and 50% sodium chloride.

Another low-sodium salt product is disclosed and claimed in U.S. Pat. No. 4,068,006, issued to G. J. Moritz and entitled "Salt Seasoning Mixture." The principal ingredients of the mixture are sodium chloride (.+/-65% by weight), potassium chloride and citric acid granules, the latter being encapsulated with a non-toxic substance such as gelatin, cellulose wax or hydrogenated vegetable oil. The citric acid acts as an agent for masking the bitter taste of the potassium chloride but, according to the inventor, requires encapsulation to overcome the delinquescence nature of citric acid to avoid "caking" of the mixture.

In U.S. Pat. No. 4,107,346, issued to H. L. Kravitz and entitled "Dietary Salt Compositions," a salt composition is proposed which is comprised of the basic mineral element cations, sodium (92-93.1%), potassium (2.4-3.4%), calcium (3.1-3.4%) and magnesium (1.2-1.4%) together with one or more trace elements essential to the human diet.

U.S. Pat. Nos. 4,556,566; 4,556,567; and 4,556,568 teach compositions containing potassium chloride as a salt substitute wherein the potassium chloride comprises the core of the particle which is then coated with a maltodextrin ('567), a coating mixture of maltodextrin and sodium chloride ('566), and a coating mixture of maltodextrin, sodium chloride and cream of tartar (potassium bitartrate) ('568). Such potassium salt substitutes however, have been found to be unacceptable since they exhibit a bitter organoleptic taste when used and, thus, have not been fully effective at replacing sodium chloride.

NuLYTELY® is a composition comprising PEG-3350, sodium chloride, sodium bicarbonate and potassium chloride for oral solution. However, this composition is designed to induce diarrhea to rapidly cleanse the bowel. Accordingly, the relative amounts of the constituents are very different from the composition of the instant invention. For example, the amount of PEG used in NuLYTELY® is 420 g. This amount is approximately 20 times greater the amount to be used daily in the salt substitute of the instant invention. NuLYTELY® contains more sodium than potassium (approximately 7.5 times higher). The ratio between PEG and KCl is 0.0035, more than 100 times lower than the approximate ratio desirable for the instant invention. KCl concentration after reconstitution of NuLYTELY® in 4 liters of water is 0.037%, which is more than 100 times lower than the approximate concentration desired for complex formation in the instant invention.

Accordingly, there remains a need for a "salt substitute" which permits a consumer to reduce their salt intake without substantially changing the manner of applying salt and which tastes as salty as table salt yet contains less sodium content. Such a product, ideally, would not change the organoleptic properties expected from salt, nor its manner of use, such as shaking, dipping or licking and so forth.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a novel and highly palatable low-sodium substitute for table salt comprising a biocompatible uncharged polymer comprising an oxy or a hydroxyl group. In one embodiment, the polymer is a polyethyleneglycol (PEG)-containing polymer.

In another embodiment, the invention provides compositions comprising a biocompatible uncharged polymer comprising an oxy or a hydroxyl group (for example, a (PEG)-containing polymer), sodium chloride (in sufficient amount to promote a normal salty taste) and potassium chloride (in sufficient amount to provide a protective effect against the toxicity of sodium). In an additional embodiment, the composition would further comprise magnesium (in sufficient amount to mask or overcome the bitter taste of potassium and to supplement the otherwise low dietary supply of magnesium).

In another embodiment, the invention discloses palatable tablets or powders designed specifically for KCl supplementation. Because some patients are losing KCl, they need potassium as an essential mineral. As described above, KCl by itself has a terrible taste. Coated tablets (as described in the prior art) can cause problems by themselves. A dosage-form (i.e., a powder or a tablet) comprising a biocompatible uncharged polymer comprising an oxy or a hydroxyl group (e.g., PEG) and KCl (or any other potasium salt) is therefore an advance over the formulations known in the art.

The invention is generally drawn to a seasoning composition including potassium chloride and polyethylene glycol, wherein the potassium chloride and polyethylene glycol are present in a weight ratio from about 2:1 to about 1:4.

In one embodiment of the seasoning composition, the composition further comprises sodium chloride. In one aspect of this embodiment, the sodium chloride makes up between about 5 and 25% of the seasoning composition by weight. In another aspect of this embodiment, the composition further comprises magnesium chloride. Optionally, the magnesium chloride makes up about 2% of the seasoning composition by weight. In another aspect of this embodiment, the composition further comprises a cream. Optionally, this cream is a dairy product or a non-dairy product.

In another embodiment of the seasoning composition, the composition further comprises magnesium chloride. In one aspect of this embodiment, the magnesium chloride makes up about 2% of the seasoning composition by weight. In another aspect of this embodiment, the composition further comprises a cream. Optionally, this cream is a dairy product or a non-dairy product.

In another embodiment of the seasoning composition, the polyethylene glycol has an average molecular weight of between 500 to 20,000.

The invention is also generally drawn to a food or drink item comprising the above described seasoning composition.

In one embodiment of the invention, the food item is a member of the group consisting of meat, dairy products such as cheese, vegetables, fruits, grains, prepared foods and snack foods.

In another embodiment of the invention, the drink item is tomato juice or a soup.

The invention is also generally drawn to a method of seasoning food or drink, said method comprising adding to said food or drink an effective amount of the above described seasoning composition.

In one embodiment of the method of seasoning food or drink, the food item is a member of the group consisting of meat, dairy products such as cheese, vegetables, fruits, grains, prepared foods and snack foods.

In another embodiment of the method of seasoning food or drink, the drink item is tomato juice or a soup.

In another embodiment of the method of seasoning food or drink, the seasoning composition is first dissolved in aqueous solution and then added to said food or drink. In one aspect of this embodiment, the food item is a member of the group consisting of meat, dairy products such as cheese, vegetables, fruits, grains, prepared foods and snack foods. In another aspect of this embodiment, the drink item is tomato juice or a soup.

The invention is also generally drawn to a method for administering a low sodium diet to a patient in need thereof comprising the administration of the above described seasoning composition.

In one embodiment of the method of administering a low sodium diet to a patient, the seasoning composition is first added to food or drink and then administered to the patient. In one aspect of this embodiment, the food item is a member of the group consisting of meat, dairy products such as cheese, vegetables, fruits, grains, prepared foods and snack foods. In another aspect of this embodiment, the drink item is tomato juice or a soup.

The invention is also generally drawn to a method for administrating potassium orally, in a palatable form, to a patient in need thereof comprising the administration of the above described seasoning composition.

In one embodiment of the method of administrating potassium orally, the seasoning composition is first added to food or drink and then administered to the patient. In one aspect of this embodiment, the food item is a member of the group consisting of meat, dairy products such as cheese, vegetables, fruits, grains, prepared foods and snack foods. In another aspect of this embodiment, the drink item is tomato juice or a soup.

Additional embodiments disclose methods of making the inventive compositions, foodstuffs comprising such compositions, and methods for administering a low sodium diet to a patient in need of such comprising the administration of foods comprising the compositions.

Other features and advantages of the invention will be apparent from the following detailed description and claims.

DETAILED DESCRIPTION OF THE INVENTION

Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. Although methods and materials similar or equivalent to those described herein can be used in the practice or testing of the invention, suitable methods and materials are described below. All publications, patent applications, patents, and other references mentioned herein are incorporated by reference in their entirety. In the case of conflict, the present specification, including definitions, will control. In addition, the materials, methods, and examples are illustrative only and not intended to be limiting.

A surprising and unexpected taste result has been discovered with respect to low-sodium salt substitute compositions. Specifically, the addition of a biocompatible uncharged polymer comprising an oxy or a hydroxyl group to a composition comprising, for example, potassium chloride and sodium chloride, results in an enhancement of the salty flavor of the composition while the unpleasant taste of potassium chloride is being eliminated. Accordingly, less sodium can be used in the composition without sacrificing the salty taste.

If one consumes 12 grams of table salt per day (current average level for the population of the U.S.A.), 4.72 grams of sodium is ingested. An equivalent consumption of the proposed low-sodium salt substitute would result in the ingestion of less grams of sodium per day.

While not wishing to be bound by theory, it is possible that biocompatible uncharged polymers comprising an oxy or a hydroxyl group have the capacity to sequester cations (for references see: Tordoff MG,. Am. J. Physiol. 273: R587-96 (1997) and Bogan M, Agnes GR,. J. Am. Soc. Mass. Spectrom. 13:177-86 (2002), each hereby incorporated by reference). Accordingly, in one embodiment, the types of available polymers would include such biocompatible uncharged polymers, whether the polymers are natural or synthetic. PEG is clearly an example of such a synthetic polymer and Ficoll and Dextran are examples of natural polymers. In a preferred embodiment, the molecular weight of the PEG would range from about 500 to 20,000 Daltons.

The addition of such polymers may be utilized to enhance the salty flavor of many of the prior art "low salt" compositions, while avoiding additional unpleasant tastes, particularly when such formulations comprise potassium chloride or sodium chloride. This unexpected and unpredictable taste effect for the proposed low-sodium composition results in a significant reduction of the amount of sodium intake via the composition as compared to the sodium intake for table salt where the desired saltiness taste effect or level is constant. Accordingly, in one embodiment, the invention relates to compositions for enhancing the pleasant salty flavor of foods.
Accordingly, in one embodiment, the invention relates to methods for enhancing the pleasant salty flavor of foods through use of the inventive compositions.

Accordingly, in another embodiment, the invention relates to methods for administering a low sodium diet to a patient in need thereof.

The compositions of the present invention may be prepared by thoroughly mixing the components until a homogeneous product is attained. Accordingly, the proposed low-sodium

salt substitute composition may look, pour, repose, store and taste like table salt.

Low-sodium salt substitutes of the present invention can be added to a wide variety of foods in flavor-enhancing amounts. A flavor-enhancing amount depends on the particular taste of the user, the particular food and the particular effect desired. Generally, the amount of salt in foodstuffs varies from about 0.5% to about 4% by weight. In many commercially prepared foods, salt or salt substitutes are added in amounts of from about 0.5% to about 1% by weight of the food. The low-sodium salt substitute and dietary supplement of the present invention can be added to any foodstuff where a salty taste is desired or expected, such as cheese, mashed potatoes, juices, vegetables, meat, poultry, fish, snack foods and the like.

In one embodiment, the invention relates to a composition capable of imparting a salty taste, the composition comprising a biocompatible uncharged polymer comprising an oxy or a hydroxyl group.

In another embodiment, the invention relates to a composition capable of imparting a salty taste, the composition comprising a potassium salt and a biocompatible uncharged polymer comprising an oxy or a hydroxyl group.

In another embodiment, the invention relates to a composition according to the instant invention, wherein the polymer is a polyethylene glycol-containing polymer.

In another embodiment, the invention relates to a composition according to the instant invention, wherein the polymer is a polysaccharide.

In another embodiment, the invention relates to a composition according to the instant invention, wherein the polysaccharide is dextran or dextrin.

In another embodiment, the invention relates to a composition according to the instant invention further comprising a dairy or non-dairy cream.

In another embodiment, the invention relates to a composition according to the instant invention further comprising a sodium salt. In another embodiment, the invention relates to a composition according to the instant invention, wherein further comprising a magnesium salt

Although not willing to be bound by theory, it is likely that a complex exists between potassium ions and the polymer. Such a complex is formed when a concentrated aqueous solution comprising the polymer and the potassium ions are prepared. In a preferred embodiment of the invention, the concentration of each of the typical constituents of the complex, PEG and KCl, should be at least about 4% and preferably at least about 10%. This aqueous solution can be made even more concentrated by the evaporation of water and can be further dried to a solid state that is then ground to powder. Accordingly, in this embodiment, one should first form the complex and then convert it to a powder. Alternatively, the concentrated solution of the complex can be used as such (without drying it completely). A concentrated solution of the complex is especially useful, for example, in the preparation of cheese.

In order to limit the amount of sodium chloride in the composition, the concentration of sodium should be significantly lower than that of the potassium chloride. In a preferred embodiment, the concentration of NaCl should be less than about 50% of the concentration of

KCl. In another preferred embodiment, the concentration of NaCl should be less than about 25% of the KCl concentration. In another preferred embodiment, the concentration of NaCl should be less than about 10% of the KCl concentration.

In a preferred embodiment, the weight ratio between the polymer and the KCl in the complex is formulated to be in the range of about 0.2:1.0 to about 20:1 of PEG:KCl. Accordingly, 1:5, 1:4, 1:3, 1:2, 1:1, 2:1, 3:1, 4:1, 5:1, 6:1, 7:1, 8:1, 9:1, 10:1, 11:1, 12:1, 13:1, 14:1, 15:1, 16:1, 17:1, 18:1 and 19:1 would all be acceptable weight ratios.

In another embodiment, the invention relates to a food item comprising the inventive composition. In one aspect, the composition is in a dry form. In another aspect, the composition is in a wet form.

In another embodiment, the invention relates to a method for administering a low sodium diet to a patient in need thereof comprising the administration of the inventive composition.
In another embodiment, the invention relates to a method for administrating potassium orally, in a palatable form, to a patient in need thereof comprising the administration of the inventive composition comprising potassium.
The invention is further illustrated in the following non-limiting examples.

EXAMPLES

Example 1: Preparation of a salt substitute containing PEG and KCl.

6 g of PEG (average molecular weight 3,500) plus 3 g KCl were dissolved in 50 ml double distilled water and let dry in a flat vessel, at 37^0 C.

The dry material was then ground to a fine powder (salt-like grains) and submitted to the following test: equal pieces of the egg-white portion of boiled eggs were dipped either in (1)

plain salt (NaCl), (2) a common salt substitute based on a mixture of potassium phosphate and potassium chloride or (3) our preparation as described above. A group of eight unbiased healthy volunteers tested these three samples and rated their taste. The consensus was as followed: Sample (3) has the most pleasant salty taste, sample (1) tastes like regular salt while sample (2) has a very unpleasant taste.

Example 2: Preparation of a salt substitute containing PEG, KCl and 6.6% NaCl.

6 g of PEG (average molecular weight 3,500) plus 2.4 g KCl and 0.6 g NaCl were dissolved in 50 ml double distilled water and let dry in a flat vessel, at 37^0 C.

The dry material was then ground to a fine powder (salt-like grains) and submitted to the following test: equal pieces of the egg-white portion of boiled eggs were dipped either in (1) plain salt (NaCl), (2) a common salt substitute based on a mixture of potassium phosphate and potassium chloride or (3) our preparation as described above. A group of eight unbiased healthy volunteers tested these three samples and rated their taste. The consensus was as followed: Sample (3) has the most pleasant salty taste, sample (1) tastes like regular salt while sample (2) has a very unpleasant taste.

Example 3: Preparation of a salt substitute containing PEG, KCl, MgCl and 8% NaCl.

28 g of PEG (average molecular weight 3,500) plus 15 g KCl, 1 g $MgCl_2.6H_2O$ and 4 g NaCl were dissolved in 150 ml double distilled water and let dry in a flat vessel, at 37^0 C.

The dry material was then ground to a fine powder (salt-like grains) and submitted to the following test: equal pieces of the egg-white portion of boiled eggs were dipped either in (1) plain salt (NaCl), (2) a common salt substitute based on a mixture of potassium phosphate and potassium chloride or (3) our preparation as described above. A group of eight unbiased healthy volunteers tested these three samples and rated their taste. The consensus was as

followed: Sample (3) has the most pleasant salty taste, sample (1) tastes like regular salt while sample (2) has a very unpleasant taste.

Example 4: Preparation of a salt substitute containing PEG, KCl and MgCl , without NaCl.

30 g of PEG (average molecular weight 3,500) plus 17 g KCl and 1g $MgCl_2.6H_2O$ were dissolved in 150 ml double distilled water and let dry in a flat vessel, at 37^0 C.
The dry material was then ground to a fine powder (salt-like grains) and submitted to the following test: equal pieces of the egg-white portion of boiled eggs were dipped either in (1) plain salt (NaCl), (2) a common salt substitute based on a mixture of potassium phosphate and potassium chloride or (3) our preparation as described above. A group of eight unbiased healthy volunteers tested these three samples and rated their taste. The consensus was as followed: Sample (3) has the most pleasant salty taste, sample (1) tastes like regular salt while sample (2) has a very unpleasant taste.

Example 5: The low-sodium salt substitute composition of the present invention is preferable to commercially available table salt in commercial instant mashed potatoes.
A low-sodium salt substitute composition in accordance with the present invention is subjected to paired preference and paired comparison (saltiness) taste testing by a panel of 40 untrained judges. The inventive composition is compared against a commercially available salt in the well accepted test medium of mashed potatoes. The commercially available salt (Morton's iodized salt) in the mashed potato composition constitutes the "reference sample." The low-sodium salt substitute composition in a like mashed potato composition constitutes the "test sample."

Betty Crocker brand potato buds are then used to prepare the mashed potato samples for taste

evaluation. Each treatment of mashed potatoes contains four cups of de-ionized water, two cups of milk (3.2% minimum fat, homogenized, pasteurized), and four cups of potato buds. No butter or margarine is used. For the sodium chloride treatment (reference samples), the recommended level of 1.5 teaspoons of sodium chloride (iodized salt) is used. The reference treatment of mashed potatoes is made according to the following directions: heat the water, milk and salt as a mixture to boiling; remove the mixture from heat and stir in potato buds until just moistened; let stand until liquid is absorbed (about 30 seconds); and whip with fork until desired consistency. The reference treatment of mashed potatoes is held over a steam table to keep warm during the time required to serve. The test treatment of mashed potatoes containing the low-sodium salt substitute composition is prepared in a like manner.

The paired preference and paired comparison (saltiness) taste testing by the 40 panelists is conducted in accordance with ASTM standard recommended practices for sensory evaluation of food products. All reference and test samples of mashed potatoes are coded and not otherwise identified to the panelists. For the paired preference test, a majority of the panelists will prefer the "test sample" (mashed potatoes containing the low-sodium salt substitute composition of the invention). For the paired comparison test, a majority of the judges will find the low-sodium test sample to be "more salty.

Example 6: The low-sodium salt substitute of the present invention is preferable to commercially available table salt in tomato juice .

A low-sodium salt substitute composition in accordance with the present invention is subjected to consumer acceptance taste testing for "saltiness flavor" and for "overall desirability," by a panel of 35 untrained judges, with respect to commercially available salt in the well accepted test medium of tomato juice. The commercially available salt (Morton's

iodized salt) in the tomato juice composition constitutes the "reference sample." The low sodium salt substitute composition of the instant invention is placed in a like tomato juice composition and constitutes the "test sample."

Unsalted tomato juice samples are prepared by mixing unsalted S & W brand tomato puree with de-ionized water in a ratio of 1 part tomato puree to 3 parts water. For the sodium chloride treatment (reference samples) 1% by weight of the iodized salt is mixed into the prepared unsalted tomato juice. For the test treatment (test samples), 1% by weight of the low-sodium salt substitute composition is mixed into the prepared unsalted tomato juice. All reference and test samples of tomato juice are coded and not otherwise identified to the panelists.

Acceptance testing of the test samples versus the reference samples is based upon the rating of samples on the "Hedonic" scale as described by D. R. Peryam and F. J. Pilgram ("Hedonic Scale Method of Measuring Food Preferences," Food Technology, 11(9); 9-14, (1957), hereby incorporated by reference). The Hedonic scale equates the numerical values 1-9 to successive scale points at the "dislike" end of the scale to the "like" end of the scale. Thus, the samples (reference and test) are rated by each panelist or judge and "mean ratings" for the samples are developed and compared statistically.

The results will indicate that with respect to "saltiness flavor" or "overall desirability" for the tomato juice samples compared, the panelists will find that there is either little significant difference between the samples or that the tomato juice comprising the inventive composition is preferred.

EQUIVALENTS

While several particular embodiments of this invention have been described above, it will be understood that the invention is not to be limited thereto, since numerous modifications may be made, and it is contemplated, therefore, by the appended claims, to cover any such modifications as fall within the spirit and scope of this invention.